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Breast-feeding among Mothers of Low Birth Weight Infants

SUMMARY

The physical and emotional condition of the mother delivering a premature or low birth weight infant may be quite different than that of the mother of a healthy term infant when initiating breast-feeding. Despite this difference, incidence and duration of lactation among mothers of pre-term or low birth weight infants was found to be quite good compared with that of mothers of term infants. Considerable problems, however, are encountered by premature or low birth weight infants when breast-feeding, including delayed first suckling, poor or no suction, need for daily supplemental bottle feeding, and culminating sometimes in weaning off breast milk before discharge. Optimal milk production has been associated with five or more milk expressions daily and with pumping durations of 100 minutes or more daily and initiation of pumping early in the first post-partum days. (*Can Fam Physician* 1990; 36:1533–1536, 1615.)

RÉSUMÉ

Au début de l'allaitement, l'état physique et émotionnel des mères ayant accouché de prématurés ou d'enfants de petit poids de naissance peut être très différent de celui des mères d'enfants à terme en santé. En dépit de tout ceci, les mères de prématurés ou de bébés de petit poids de naissance ont une incidence et une durée d'allaitement fort bonnes comparées à celles des mères de bébés à terme. Toutefois les prématurés ou les bébés de petit poids de naissance manifestent des problèmes considérables à l'allaitement incluant un retard à la première têtée, une succion déficiente ou nulle, un besoin de compléments quotidiens à la bouteille culminant parfois en la cessation de l'allaitement avant la sortie de l'hôpital. Une bonne production de lait a été associée à ≥5 expressions/jour, à une durée d'expression de >100 minutes/jour et à un début d'expression dans les premiers jours postpartum.

Key words: breast-feeding, family medicine, neonatal care, nutrition, obstetrics, pediatrics

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THERE ARE many differences between milk of mothers delivering pre-term and milk of mothers delivering at term. According to Gross and colleagues,[1] milk produced by mothers delivering pre-term contains more proteins and sodium but less lactose than milk from mothers delivering term infants. Pre-term milk has also been found to vary according to the degree of prematurity, containing more nitrogen, fatty acids, and energy before 32 weeks' gestation.[2] Pre-term milk has been calculated to meet the theoretic requirements to sustain intrauterine growth rate.[3]

Many publications have stated that mother's milk may be best for the premature[4,5] or low birth weight (2500 g or less) infant.[6] Growth has been found adequate when pre-term infants have been fed their own mother's milk.[7–9] Recently, it has been suggested that the breast may not necessarily be best for very premature infants.[10] Concern has mainly been raised about bone mineralization of those infants.[11] Addition of vitamin D and phosphorus to the diet, however, has been found to improve calcium and phosphorus retention in premature infants less than 1500 g fed human milk.[12]

What might be beneficial to the premature infant fed his or her mother's

milk are its immunologic properties. Indeed, it contains a higher concentration of lactoferrin, lysozyme, total IgA, and secretory IgA than milk from mothers delivering at term.[13]

Also, psychological effects of lactation may be of importance for the bonding process between mother and child. Providing milk to her premature infant is a task that only the mother can accomplish, and through it she can perhaps get a sense of being useful to the baby, get closer to the baby, and feel it is "hers." It has even been suggested that low birth weight infants whose mothers choose to provide milk had a better intellectual outcome at 18 months than infants of mothers not choosing to do so, even after adjusting for demographic and perinatal factors.[14]

Factors Influencing Initiation of Breast-feeding

Mothers of premature or low birth weight infants often experience difficulties that are not common to women giving birth to healthy full-term infants (Chart 1). The mother may be in a recovery phase of a pregnancy-related problem that could be associated with the premature birth: preeclampsia, chorioamnionitis, or hemorrhage from placenta previa or abruptio, for example. The mother may be experiencing a depression phase and wish only to go back home as quickly as possible after a prolonged hospitalization for a pregnancy-associated problem, such as prolonged rupture of membranes. The mother may be very anxious about the baby's actual or feared condition (e.g., anticipatory mourning). The mother-infant separation increases the difficulties of starting the lactation process. The separation may only be from the post-partum ward to the neonatal intensive care unit, or it may be from one city to another city, possibly much farther away. Some mothers are attempting to initiate lactation and mourning a twin at the same time. These examples illustrate possible differences between the physical and emotional condition of a mother of a premature infant and the mother of a term healthy infant when confronted with the special demands of breast-feeding.

Not only can there be differences between the mother of a premature infant and the mother of a term infant, but also the infants themselves can be different. There may be more than one infant at a time (twins or triplets), and this complicates the experience. An infant may be ill with any of the usual complications of prematurity: hyaline membrane disease, apnea, jaundice, sepsis, or intracranial hemorrhage, for example. The infant may be quite immature or quite ill on the respirator with an uncertain life prognosis for several weeks or months. The infant may be too weak to consider any attempt at breast-feeding for weeks or months. The infant may demonstrate thermal instability, thereby halting breast-feeding.

The combined maternal and neonatal factors unique to pre-term infants can make the post-partum period quite different from what the mother of a pre-term infant had expected to take place post-natally. Despite the difficulties, however, mothers of pre-term or low birth weight infants have a good potential for lactation.

Lactational Performance

In a prospective study at our hospital,[15] we compared the lactational experience of 55 mothers of 62 low birth weight infants (≤2500 g) to that of 55 mothers of 55 control term infants (≥38 weeks and >2500 g). Most low birth weight infants were pre-term (50 infants). Lactation included all periods spent by mother either pumping her breast or breast-feeding. Table 1 shows the incidence of lactation from delivery to one year. The mean duration of lactation was 3.2 months for mothers of the control group and 2.5 months for mothers of low birth weight infants. Among different birth weight categories, the mean duration of lactation was 1.8 months for the group of infants weighing 1500 g or less, 3.1 months for those weighing 1501 to 2000 g, and 2.2 months for those weighing 2001 to 2500 g. The differences between the groups were not significant.

Table 2[15–18] shows comparative data for different studies of breast-feeding among low birth weight infants compared with controls. There are large differences in incidence of breast-feeding among countries, the highest incidences being found in scandinavian countries and the lowest in Canada. The trend is also generally toward a higher incidence in term infants compared with pre-term or low birth weight infants. Overall, the performance of mothers of pre-term or low birth weight infants is good compared with that of control mothers.

Breast-feeding Performance of Low Birth Weight Infants

Many differences are found in the breast-feeding performance of low birth weight infants compared with that of

Chart 1

Factors that May Influence Initiation of Breast-feeding among Mothers of Premature or Low Birth Weight Infants

Maternal factors

- Recovery from complicated pregnancy or delivery (preeclampsia, chorioamnionitis, hemorrhage, etc.)
- Tiredness and depression after prolonged hospitalization
- Anxiety because of baby's real or apprehended condition
- Separation from baby
- Mourning of a twin

Infant factors

- Number of infants (twins, triplets)
- Illness, including critical condition on respirator
- Weakness, including extreme immaturity
- Thermal instability

term infants. In our study,[15] there were very large differences concerning first breast-feeding and the behaviour of babies at the breast. First, timing of first breast-feeding was quite late in the low birth weight group (277.3 hours) compared with the control group (3.3 hours) ($p < 0.0005$). Second, during this very first attempt, 81% of low birth weight infants sucked poorly or refused the breast, as compared with 25% in the control group ($p < 0.001$). Third, after a mean hospital stay of 24.2 days, only 3% of low birth weight infants were discharged exclusively breast-fed, while after a mean hospital stay of 4.0 days, 65% of control infants went home exclusively breast-fed ($p < 0.001$). Fourth, long-term results showed that a substantial number of mothers of low birth weight infants lactated and could never successfully breast-feed. Among low birth weight infants, 37% failed to breast-feed, compared with 2% of control infants ($p < 0.001$). Fifth, exclusive breast-feeding without any bottle complement was possible for 31% of low birth weight infants and 85% of control infants ($p < 0.001$). The rest of the infants were placed on a mixed regimen, including both breast-feeding and bottle-feeding (31% of low birth weight and 12% of control infants).

Table 1

Incidence of Lactation among Mothers of Low Birth Weight and Term Infants

Time Post-partum	Low Birth Weight Group (%)[a]	Term Control Group (%)[a]
At delivery	58	73
1 month	44	51
2 months	27	40
3 months	13	29
6 months	4	13
9 months	2	5
12 months	2	4

a. n = 55

Table 2

Incidence of Lactation at Delivery, Three Months, and Six Months Post-partum among Mothers of Low Birth Weight and Term Infants

Country and Year	At delivery (%)	3 months (%)	6 months (%)
Norway 1978–80[16]			
Pre-term	96	61	45
Term	96	83	59
Brazil 1982[17]			
< 2500 g	83	42	23
≥ 2500 g	93	55	31
Finland 1983[18]			
Low birth weight ≤ 2500 g	91	67	46
All birth weights	99	90	70
Canada 1984[15]			
Low birth weight ≤ 2500 g	58	13	4
Term > 2500 g	73	29	13

Source: See references 15–18.

Several problems encountered by low birth weight infants when breast-feeding have been reported in different studies:

- late age at first suckling[15,19];
- poor or no suction at first suckling[15];
- need for daily supplemental bottle-feeding[15,18];
- weaning off breast milk before discharge[20];
- failure to breast-feed exclusively on discharge[15,16];
- failure to establish effective infant suckling[15,19]; and
- shorter duration of breast-feeding.[16]

This list shows that there are considerable difficulties and that milk expression by the mother is most often necessary because of the inability of the baby to breast-feed directly.

Milk Expression

Milk can be collected by hand or with the help of a breast pump operated either manually or electrically. When the success of pre-term infants' mothers in producing milk was examined, it was found that, while 70% of mothers elected to produce milk for their infants, this milk represented only 27% of all enteral feeds.[21] This disparity shows that milk collection is indeed a problem for mothers of pre-term infants. A contributory factor may be the distaste for pumping milk clearly expressed by some mothers in our study.

A report[22] on milk production by mothers of premature infants concluded that optimal milk production was associated with five or more milk expressions per day and pumping durations that exceeded 100 minutes per day. It was also found that there was a negative correlation between milk volumes at two weeks post-partum and time to initiate milk expression. A recent study[23] showed that breast milk production for mothers of premature infants increased with the use of a relaxation/imagery audiotape. Medication therapy with metoclopramide has also been shown to have a positive effect on faltering milk pro-

duction by mothers of premature infants by increasing their basal serum prolactin levels.[24]

When milk is collected to be stored for later use, there is a concern that bacteriologic contamination could occur and be a potential source of morbidity to infants. Mothers of premature infants had their milk cultured when bringing it in the neonatal unit or when it was given to their babies.[25] Ten per cent of their milk was found to contain 10^{3-5} colony-forming U/mL, while 27% was found to contain $\geq 10^6$ colony-forming U/mL. Most of this colonization was found in the milk when it was being given to the baby by continuous nasogastric tube. Feeding premature infants with human milk containing $\geq 10^3$ was associated with an increased incidence of feeding intolerance and at levels $\geq 10^6$ colony-forming U/mL, it was associated with suspect sepsis.

Practical Aspects

In our institution, soon after delivery, mothers are encouraged to pump their milk for infants not yet ready to breast-feed by our standards. The mothers are taught and showed a video about the technique of pumping their milk. Most mothers collect their milk either manually or with a piston-type manual pump. The milk is collected in sterile bottles and stored in plastic bags in the refrigerator or in the freezer for later use. Infants are first tried at the bottle when they reach 1600 g. They are moved from the incubator to a cot when they reach 1800 g, and from that point they are eligible to try breast-feeding if they bottle-feed well without gavage feedings and do not suffer any significant remaining morbidity (apneic spells, bradycardias, need for oxygen).

Discharge usually occurs around 2000 g.[26] Mothers are encouraged to start breast-feeding before hospital discharge of their infants in order to benefit from nurses' help and expertise. The frequency and duration of breast-feeding sessions are gradually increased according to the response of the infant. For infants in the neonatal unit, a breast-feeding room is available for intimacy to initiate breast-feeding. Low birth weight infants weighing between 1800 g and 2500 g can benefit from rooming in if their mothers are still in hospital and if they are in good health. Very low birth weight infants ($\leq$1000 g) are supplemented with 1000 units of vitamin D and phosphorus in their diet until discharge. Once at home, mothers are encouraged to gradually wean their infants from complement feedings to achieve complete breast-feeding.

Research Aspects

Despite all the difficulties described above for breast-feeding the premature or low birth weight infant, some researchers have reported remarkable results with such infants. Pearce and Buchanan[27] have reported on the breast-feeding management of 17 consecutive babies <1500 g, most of whom had weights appropriate for gestational age. They first received gavage feedings, then breast- or bottle-feedings were started when sucking movements were noted. Breast-fed babies were not fed by bottle. Twelve babies started breast-feeding at a mean age of 11 days and weight of 1324 g. Ten babies were successfully fully breast-fed by a mean age of 27 days and a mean weight of 1600 g; they were discharged at a mean weight of 1677 g.

Meier and Anderson[28] have reported the responses of five small pre-term infants to both bottle- and breast-feeding. All infants were bottle-fed before breast-feeding was begun, but no prerequisite to take a specific amount of milk per bottle without difficulty or distress before starting breast-feeding was imposed. Breast-feeding was initiated when the infants had a mean weight of 1338 g (1220 to 1400 g) and a mean post-conception age of 34 weeks (32 to 36 weeks). They found that infants demonstrated different sucking mechanisms for the two feeding methods with better co-ordination of sucking, swallowing, and breathing during breast-feeding. Also there was a greater decline in transcutaneous PO_2 during bottle-feeding than during breast-feeding, and infants' mean skin temperature rose more during breast-feeding. These results are promising but need to be further substantiated before generalization to all pre-term infants.

The Family Physician's Role

It is suggested that, on an individual basis, physicians have little influence on the mother's choice for breast-feeding.[29] Indeed, most mothers have already made their decisions at the beginning of pregnancy or even before,[15,30] largely influenced by sociocultural factors.[30,31]

Physicians may, however, influence those sociocultural factors by visibly promoting breast-feeding in the community.[32] Physicians can also help women who, having decided to breast-feed, feel as though they must change their plans because of unexpected conditions, like twin pregnancy, prematurity, or need for medication. Most of these women can be reassured and encouraged to keep their initial intention.

After delivery, physicians should try to limit the mother-infant separation whenever possible, to foster the well-being of the mother-infant pair, and to facilitate breast-feeding. To enhance the physiologic surge of lactational hormones, it is important to encourage the initiation of feeding at the breast as soon as medically possible for the premature or low birth weight infant. If the infant cannot be fed at the breast, the physician should encourage mothers to pump their milk starting as early as possible in the first days after delivery. Milk should be collected in as sterile conditions as possible. The technique of pumping milk is very simple and is the same for mothers of pre-term or term infants. It can be taught by experienced doctors or nurses, by viewing a video, by written explanations, or by members of La Leche League. While playing a facilitating rôle for breast-feeding, the family physician should remain aware that familial, social, and cultural influences may be much stronger than his or her influence on the breast-feeding mother.

Conclusion

It is clear that mothers of premature or low birth weight infants have a potential for lactation similar to that of mothers of term infants. However, because of numerous infant factors that interfere with breast-feeding, mothers often have to keep lactating artificially by pumping their milk. During this process, milk production may become inadequate to meet infant needs. For a mother-infant pair, changing from milk extraction and bottle-feeding to breast-feeding is not always easy, but it is possible. Research in this field suggests that infants may adapt to earlier breast-feeding than hospital practices allow. ■

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